UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P O Box 1450
Alexandria, Virginia 22313-1450
www uspto gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/506,396	09/01/2004	Robert Campbell	200608 (8830-293)	1422

23973 7590 07/14/2008
DRINKER BIDDLE & REATH
ATTN: INTELLECTUAL PROPERTY GROUP
ONE LOGAN SQUARE
18TH AND CHERRY STREETS
PHILADELPHIA, PA 19103-6996

EXAMINER	
JACOB, MARY C	

ART UNIT	PAPER NUMBER
2123	

MAIL DATE	DELIVERY MODE
07/14/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.**	**Applicant(s)**	
	10/506,396	CAMPBELL, ROBERT	
	Examiner	**Art Unit**	
	MARY C. JACOB	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 May 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *49-64* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *49-64* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 May 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. The response filed 5/5/08 has been received and considered. Claims 49-66 have been presented for examination.

Drawings

2. The objections to the drawings recited in the 2/6/08 Office Action have been withdrawn in view of new Figure 5 and in view of reconsideration of MPEP 608.01(e) regarding reservation clauses.

Specification

3. The objections to the disclosure, recited in the 2/6/08 Office Action regarding the "Detailed Description of the Drawings" have been withdrawn in view of new Figure 5 and reconsideration of MPEP 608.0 and 37 CFR 1.171.

4. The disclosure is objected to because of the following informalities: the amendment to the specification, filed 5/5/08, inserts the description of Figure 5 on page 4. It appears that this description should be inserted on page 13, after the brief description of Figure 4. (Note: the Examiner is referring to the specification dated 9/1/04 and labeled “ART 34 AMDT”. If Applicant is referring to a different copy of the specification, it is respectfully requested that Applicant note what copy they are using). Appropriate correction is required.

Claim Objections

5. The objections to the claims recited in the Office Action dated 2/6/08 have been withdrawn due to the cancellation of the claims.

6. Claims 49 and 57 are objected to because of the following informalities. Appropriate correction is required.

7. Claim 49, steps i and ii refer to “collecting data relating to initial dimensions of the structure” and “creating a computer model of the structure”, and step vii is further directed to updating the computer model using actual measured dimensions. The claim, in step ii, does not set forth that the computer model is created using the initial dimensions. However, due to step vii which updates the dimensions of the computer model, the Examiner interprets step ii as if the computer model is created using the initial dimensions of the structure obtained in step i.

8. Claim 57, line 3 recites, “the load”, it would be better if written, ”a load”.

Claim Rejections - 35 USC § 112

9. The rejections of the claims under 35 U.S.C. 112, second paragraph, recited in the Office Action dated 2/6/08 and not repeated below have been withdrawn in view of the cancellation of the claims.

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 52, 57-64 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

12. Regarding claims 52 and 57, the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

13. Claim 57, lines 1-4 are directed to "processing means" for "containing a computer model of the structure to be analyzed" and "for using data relating to the load on the structure in a calculation of a value representing the integrity of the structure". It appears from the claim language that the computer model is not used to calculate the value representing the integrity of the structure. This is contrary to step xi of claim 49 and to the last step in Figure 5. Therefore, it is unclear whether or not the computer model is used to calculate this value of integrity for the structure.

14. Claim 57, lines 8 and 10 recite, "said data", however, the claim refers to "data relating to the load on the structure in line 3 and "data relating to the dimensions of the structure" in lines 4-5. Therefore, it is unclear what data "said data" refers to.

15. Claim 57, lines 9-10 recite "update the computer model of the structure and to recalculate a value representing the integrity of the structure, using said data". It is unclear whether updating the computer model and recalculating the value representing the integrity of the structure are separate steps or whether the computer model is updated and then used to recalculate the value for the integrity of the structure. It is also unclear where or when the initial value of the integrity of the structure, which is

recalculated in line 9, was actually calculated. Further, it is unclear whether the "said data" in line 10 is used to both update the computer model in line 9 and recalculate the integrity value, or is just used to recalculate the integrity value.

16. Claims 59-64 recite, “the sensors”. It is unclear whether these refer to the “first sensors”, the “second sensors”, or both as recited in Claim 57.

Claim Rejections - 35 USC § 101

17. The rejection of the claims under 35 U.S.C. 101 recited in the 2/6/08 Office Action has been withdrawn in view of the cancellation of the claims.

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

19. Claims 49-54, 56-59, 61-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scott et al (US Patent 4,480,480, cited in previous office actions) in view of Carter et al, (“Automated 3-D Crack Growth Simulation”, International Journal for Numerical Methods in Engineering”, 47, pages 229-253, 2000), further in view Paulsamy et al (European Patent Application 89115607.7, cited in previous office actions).

20. As to Claims 49, 52 and 57, Scott et al teaches: a method and system for assessing the integrity of a structure, the system for performing the method comprising the steps of: (i) collecting data relating to initial dimensions of the structure (column 11, lines 20-24; column 11, line 66-column 12, line 1); (ii) creating a computer model of the structure (column 11, line 66-column 12, line 1; column 16, line 64-column 17, line 4); (iii) collecting data relating to an estimated load on the structure (column 10, lines 18-20; column 14, lines 13-33; column 17, lines 5-21); (iv) analyzing the structure, using the computer model of the structure and the load data, in order to define high stress areas in which areas of the structure future problems can be expected (column 11, line 66-column 12, lines 7 and lines 27-35; column 13, lines 10-17 and lines 25-29; column 20, lines 4-10 and line 50; column 21, lines 30-34 and lines 50-61; column 22, lines 15-20); (v) installing sensors in high stress areas (Figure 4, element 42; column 10, lines 9-14; column 16, line 21; column 17, lines 30-32; column 21, lines 50-52); (vi) measuring, after a time interval, the natural frequency and impulse response of the system that reflect the changing physical dimensions of the structure (column 11, line 66-column 12, line 7); (vii) updating the computer model of the structure, using the results of step vi (column 10, lines 9-14; column 12, lines 1-7); (viii) installing, in the high stress areas, a second set of sensors for measuring load on the structure in said high stress areas (Figure 4, element 42; column 10, lines 9-14; column 16, line 21; column 17, lines 30-32; column 21, lines 50-52); (ix) measuring the actual load on the structure (column 10, lines 9-23; column 14, lines 13-46); (x) updating the data relating to the load on the structure (column 10, lines 9-23; column 14, lines 13-46); (xi) reanalyzing the structure,

using the updated computer model and the updated load data in order to calculate a value for the integrity of the structure (column 10, lines 9-23 and lines 56-62). Scott et al further teaches: processing means such as a computer, for containing a computer model of the structure and for using data relating to the load on the structure in a calculation of a value representing the integrity of the structure (Scott et al: Figure 4, element 48; Figure 17, elements 123 and 126 and description, column 10, lines 52-66), sensors to measure data relating to the dimensions, load and defects of the structure being adapted to transmit data in real-time (Figure 4, element 42; column 10, lines 9-14), the sensors connected to a data logger (Figure 4, element 50) and connected to the processing means to analyze the data in order to update the calculation of the value representing the integrity of the structure using said data (Figure 4, element 48 and description; column 10, lines 9-14).

21. Scott et al does not expressly teach: the sensors measuring the dimensions of the structure in high stress areas and updating the computer model with the new measured dimensions.

22. Carter et al teaches a model environment for representing evolving 3-D crack geometry and for testing various crack growth mechanics through automated simulation that lessens the tedious and time-consuming operations that are usually associated with crack growth analyses (Abstract, lines 2-3 and lines 10-11) wherein an initial computer model of the structure is developed (section 1, paragraph 1, lines 2-3, "initial data preparation"; section 1, paragraph 5, lines 3-7, "geometry of a cracked body..."; section 2, paragraph 1, 5-7, “description of the solid model geometry”; section 3.1, paragraph 1,

lines 4-6, "explicit description of the solid model..."), the model used to evaluate the structural integrity of a structure (section 1, paragraph 1, lines 2-4; section 7.2, last paragraph), wherein the computer model is continuously updated using data relating to updated defect geometry (section 2, paragraph 1, lines 1-3; section 2, paragraph 3, "By means of an update function...create a new representational model...which includes the crack growth increment"; section 2, paragraph 4, lines 1-2, "This sequence of operations...is repeated until a suitable termination condition is reached").

23. Scott et al and Carter et al are analogous art since they are both directed to the continuous assessment of the structural integrity of a structure including monitoring the growth of cracks in the structure.

24. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the structural integrity assessment system as taught in Scott et al to include updating the computer model and performing the analysis by computer simulation as taught in Carter et al since Carter et al teaches a model environment for representing evolving 3-D crack geometry and for testing various crack growth mechanics through automated simulation that lessens the tedious and time-consuming operations that are usually associated with crack growth analyses (Abstract, lines 2-3 and lines 10-11).

25. Scott et al as modified by Carter et al do not expressly teach measuring dimensions of the structure in high stress areas.

26. Palusamy teaches a system for monitoring wall thinning of pipes in a nuclear reactor due to corrosion and erosion (column 1, lines 1-5) that enables for efficient

management and assessment of corrosion-erosion data and for the automatic evaluation of inspection data to produce an assessment of the containment integrity of at least one component (column 1, lines 38-40; column 2, lines 8-12), wherein dimensions of the structure in areas of high stress are measured and compared to initial, or characteristic, dimensions of the structure in evaluating structural integrity for the structure (column 2, lines 8-12 and lines 34-45; column 3, lines 12-25; column 4, line 46-column 5, line 13).

27. Scott et al and Palusamy et al are analogous art since they are all directed to the continuous evaluation of the structural integrity of a structure.

28. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the continuous assessment of structural integrity using computer models and computer simulation as taught in Scott et al as modified by Carter et al to further include measuring dimensions of the structure as taught in Palusamy since Palusamy teaches a system for monitoring the structural integrity of pipes in a nuclear reactor due to corrosion and erosion (column 1, lines 1-5) that enables for efficient management and assessment of corrosion-erosion data and for the automatic evaluation of inspection data to produce an assessment of the containment integrity of at least one component (column 1, lines 38-40; column 2, lines 8-12).

29. As to Claim 50, Scott et al in view of Carter et al, further in view of Paulsamy teach: repeating one or more times steps vi, vii, ix, x and xi (Scott et al: column 10, lines 9-23; column 14, lines 13-46; Carter et al: section 2, paragraph 1, lines paragraph 1, lines 1-3; section 2, paragraph 3, "By means of an update function...create a new

representational model...which includes the crack growth increment"; section 2, paragraph 4, lines 1-2, "This sequence of operations...is repeated until a suitable termination condition is reached"; Paulsamy: column 1, lines 49-55).

30. As to Claims 51 and 58, Scott et al in view of Carter et al, further in view of Paulsamy et al teach: visualizing the results of step xi (Scott et al: column 6, lines 44-52; column 10, lines 52-62; Carter et al: Figures 21, 22, 23 and descriptions; section 2, paragraph 1, lines 1-3; section 2, paragraph 3, "By means of an update function...create a new representational model...which includes the crack growth increment"; section 2, paragraph 4, lines 1-2, "This sequence of operations...is repeated until a suitable termination condition is reached").

31. As to Claim 53, Scott et al in view of Carter et al, further in view of Paulsamy et al teach: prior to step iv, collecting data relating to known defects of the structure (Carter et al: section 1, paragraph 5, lines 3-7, "geometry of a cracked body..."; section 2, paragraph 1, 5-7, “description of the solid model geometry, including the cracks”; section 3.1, paragraph 1, lines 4-6, "explicit description of the solid model, including the crack..."; section 4.1, paragraph 2; page 247, paragraph 1, lines 1-3) and thereafter using said defect data, the computer model of the structure and the load data for defining areas which are subject to relatively high loads (Carter et al: section 2, paragraph 1, lines 1-3; section 2, paragraph 3, "By means of an update function...create a new representational model...which includes the crack growth increment"; section 2, paragraph 4, lines 1-2, "This sequence of operations...is repeated until a suitable

termination condition is reached"; Scott et al: column 10, lines 9-23; column 14, lines 13-46).

32. As to Claim 54, Scott et al in view of Carter et al, further in view of Paulsamy et al teach: prior to step iv, estimating a minimum size of defects in the structure and thereafter using said estimated defect data, the computer model of the structure and the load data for defining areas which are subject to relatively high loads (Paulsamy: column 3, lines 12-25 and Carter et al: section 4, paragraph 1; section 4.1, paragraphs 1-2 as to estimated defect data, and further, the steps of defining areas subject to relatively high loads cited above).

33. As to Claim 56, Scott et al in view of Carter et al, further in view of Paulsamy et al teach: prior to step iv, collecting data relating to a load-history of the structure and thereafter using said load history, the computer model of the structure and the load data for defining areas which are subject to relatively high loads (Scott et al: column 9, lines 35-40; column 10, lines 56-62; column 19, lines 4-8; column 20, lines 8-10; column 22, lines 26-35; column 30, lines 51-55).

34. As to Claim 59, Scott et al in view of Carter et al, further in view of Palusamy et al teach: wherein the sensors are adapted to measure pressure exerted on the structure (Scott et al: column 6, lines 65-68; column 8, lines 3-16).

35. As to Claim 61, Scott et al in view of Carter et al, further in view of Palusamy et al teach: wherein the sensors are adapted to measure mechanical loading on the structure (Scott et al: column 7, lines 12-14; column 14, lines 13-39).

36. As to Claim 62, Scott et al in view of Carter et al, further in view of Palusamy et al teach: wherein the sensors are adapted to measure fluid loading on the structure (Scott et al: column 19, lines 4-8, 44-46; column 20, lines 19-27, wherein sensors measure wave loading on an offshore platform structure and the loading on an ocean going vessel wherein it is understood that the loading on the vessel would include the weight on the structure and the pressure exerted on the structure from the surrounding water).

37. As to Claim 63, Scott et al in view of Carter et al, further in view of Palusamy et al teach: wherein the sensors are adapted to measure vibration (Scott et al: column 9, lines 35-39; column 13, line 19-column 14, line 12).

38. As to Claim 64, Scott et al in view of Carter et al, further in view of Palusamy et al teach: wherein the sensors are adapted to measure acceleration experienced by the structure (Scott et al: column 6, lines 65-68; column 7, lines 57-68).

39. As to Claims 65 and 66, Scott et al in view of Carter et al, further in view of Paulsamy et al teach: a computer readable medium comprising a computer program comprising data and instructions to carry out the method according to claim 49 when the computer program is executed on a computer system and a computer comprising a computer readable medium according to claim 65 (Scott et al: Figure 4, column 6, lines 13-56; Carter et al: section 8, paragraphs 1 and 3; Palusamy et al: Figure 1).

40. Claim 55 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scott et al in view of Carter et al, further in view of Palusamy et al as applied to claim 54 above, and further in view of Barich et al (US Patent 6,955, 100).

41. Scott et al in view of Carter et al, further in view of Palusamy et al teach structural integrity assessment that includes obtaining measurements of dimensions, including obtaining measurements through ultrasonic testing and with sensors (Scott et al: column 6, lines 13-20; Paulsamy: column 3, lines 15-25) and estimating minimum size of defects (Paulsamy: column 3, lines 12-25; Carter et al: section 4, paragraph 1; section 4.1, paragraphs 1-2).

42. Scott et al in view of Carter et al, further in view of Palusamy et al do not expressly teach: wherein the minimum size of the defects is estimated to be equal to a precision of measurement equipment for measuring the dimensions of the structure.

43. Barish et al teaches a method of inspecting vehicles which are used to transport commodities such as regulated and unregulated materials that meets and/or exceeds currently imposed federal government standards and provides a level of certainty with respect to features and structures which tend to be at high risk, that accordingly enables the use, lease or sale of units with a high degree of confidence (column 4, lines 10-19), wherein the inspection method includes measuring the dimensions of defects (column 8, lines 18-35; column 37, lines 1-3), using equipment such as ultrasonic testing devices and probe gauges wherein the equipment is capable of measurements down to a minimum specification (column 26, lines 56-62; column 37, lines 5-15).

44. Scott et al in view of Carter et al, further in view of Palusamy et al and Barish et al are analogous art since they are all directed to assessing the structural integrity of a structure.

45. It would have been obvious to one of ordinary skill of the art at the time the invention was made to modify the obtaining of measurements and estimating the minimum size defects as taught in Scott et al in view of Carter et al, further in view of Palusamy et to further include wherein the minimum size of the defects is estimated to be equal to a precision of measurement equipment for measuring the dimensions of the structure as taught in Barish et al since Barish et al teaches that measuring defects includes using equipment such as ultrasonic testing devices and probe gauges wherein the equipment is capable of measurements down to a minimum specification (column 26, lines 56-62; column 37, lines 5-15).

46. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scott et al in view of Carter et al, further in view of Palusamy et al as applied to claim 57 above, and further in view of Zachary et al (US Patent 5,867,977).

47. Scott et al in view of Carter et al, further in view of Palusamy et al teach sensors for measuring pressures and loadings on a structure for an assessment of the structural integrity of a structure.

48. Scott et al in view of Carter et al, further in view of Palusamy et al do not expressly teach the sensors used to measure temperature.

49. Zachary et al teaches a method for preserving the structural integrity of a gas turbine through a system that monitors the temperature of a working fluid with at least one temperature sensor (Abstract; column 20, lines 50-58).

50. Scott et al in view of Carter et al, further in view of Palusamy et al and Zachary et al are analogous art since they are all directed to the assessment of the structural integrity of a system.

51. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the measurement of pressures and loadings on a structure as taught by Scott et al in view of Carter et al, further in view of Palusamy et al to further include sensors to measure temperature as taught in Zachary et al since Zachary et al shows that it is known in the art that temperature could be measured with sensors for the assessment and preservation of the structural integrity of a system (Abstract; column 20, lines 50-58).

Response to Arguments

52. Applicant's arguments filed 5/5/08 have been fully considered but they are not persuasive.

53. Applicant points out that there is only one mention in Scott of computer simulation and states that the claimed invention is directed to a method and system in which a computer model of a structure is created and updated in order to assess the integrity of the structure (page 9, last paragraph-page 10, first paragraph). These statements imply to the Examiner that the claimed invention should be interpreted to be directed to "computer simulation", however, the Examiner respectfully points out that although a computer model is claimed, there is no mention of the computer model used in a “computer simulation”. As recited by the Applicant, “the claimed invention is

directed to a method and system in which a computer model of a structure is created and updated in order to assess the integrity of the structure". The computer model is created, and used in the analysis as claimed; however, the computer model isn't necessarily used in a "computer simulation", it is used in the "analysis" of the structure. As cited, Scott teaches a computer model of the structure (column 11, line 66-column 12, line 1) wherein "each structure will a distinct set of natural frequencies and will have a well-defined impulse response when the structure is new, unfatigued and has no existing cracks" and wherein the changes in the impulse response or frequency spectrum will indicate structural changes in the structure. It is understood by the Examiner that this set of natural frequencies and impulse response of the structure constitutes a computer model of the structure since they are indications of the behavior of the system. Scott further teaches a computer model (column 16, line 64-column 17, line 4), wherein "mathematical modeling" of a potential new building design can be created using the method and apparatus disclosed in Scott. These computer models are used to analyze the structure (column 12, lines 1-7, "...the impulse response will change...continuous identification of either the impulse response or equivalently, the frequency spectrum of the structure allows for identification of structural changes..."; column 16, line 64-column 17, line 4, "...mathematical modeling and laboratory testing..."), wherein the structure is analyzed using the changes in the computer model of the structure.

54. As to Claim 49, step ii, Applicant argues that the cited passages of Scott do not mention computer models or only mention a computer model when referring to

"potential new designs". As stated above, Scott teaches a computer model of the structure (column 11, line 66-column 12, line 1) wherein "each structure will a distinct set of natural frequencies and will have a well-defined impulse response when the structure is new, unfatigued and has no existing cracks" and wherein the changes in the impulse response or frequency spectrum will indicate structural changes in the structure. It is understood by the examiner that this set of natural frequencies and impulse response of the structure constitutes a computer model of an actual structure (not a structure that has yet to be built) since they are indications of the initial structure and behavior of the system and since it must be stored in a computer memory order to be compared to the current natural frequency or impulse response sensed by the sensors. Scott further teaches a computer model (column 16, line 64-column 17, line 4), wherein "mathematical modeling" of a potential new building design can be created using the method and apparatus disclosed in Scott. It is understood that a "mathematical model" in this respect is a computer model.

55. As to Claim 49, step iii, Applicant argues that the cited passages of Scott do not refer to collecting data related to an estimated load. The Examiner respectfully disagrees. The cited passages of Scott teach collecting data related to an estimated load (column 10, lines 18-20; column 14, lines 13-33; column 17, lines 5-21), wherein the ability of the structure to carry its design load is analyzed by imposing a known load and assessing the structure's ability to carry its design load. It is understood by the Examiner that the design load is the “estimated load” that the structure is designed to carry and the imposition of a known load and using the output of the SMD after this

imposition of the known load to determine the change in the ability of the structure to carry this design load is *collecting data related to an estimated load* (design load).

56. As to Claim 49, step iv, Applicant argues that none of the cited passages of Scott mentions analyzing the structure to identify areas in which future problems can be expected. The Examiner respectfully disagrees. Scott teaches, "Appropriate observation and analysis of the vibration signature can therefore provide an *early indication of the severity and location of possible trouble* and can help to prevent costly catastrophic failure" (column 13, lines 25-29). The Examiner believes that this specific teaching in Scott teaches identifying areas where future problems can be expected since there is an “early indication” of “possible trouble”.

57. As to Claim 49, steps v and viii, Applicant argues that there is no disclosure or suggestion in Scott of first or second sensors and that none of the cited sections of Scott or Palusamy are "quite on point" with what is claimed. The Examiner respectfully disagrees. The cited sections of Scott (Figure 4, element 42; column 10, lines 9-14; column 16, line 21; column 17, lines 30-32; column 21, lines 50-52) teach a plurality of sensors disposed on the structure, wherein it is understood that these plurality of sensors encompass a first and second set of sensors. These sensors are "strategically located" at "critical points" throughout the structure. It is understood that these "critical points" describe areas of concern in the structure such as areas subjected to high loads or stresses. Further Paulsamy teaches sensors used to measure wall thickness of a component at areas that are identified to be subjected to erosion and corrosion (column 2, lines 34-42; column 3, lines 12-29). It is understood by the Examiner that these points

that have been identified as being critical points that are susceptible to corrosion and erosion are areas that are subjected to high stresses, therein causing the corrosion and erosion.

58. As to Claim 49, step vi, Applicant argues that Scott cannot measure the dimensions of a structure in high stress areas previously defined after a time interval since Scott has not defined high stress areas. Scott teaches the detecting and locating cracks in a structure (column 11, line 66-column 12, line 7; column 12, lines 27-35; column 13, lines 10-17 and lines 25-29 for example) wherein it is understood by the Examiner that the detecting and locating of cracks in a structure define high stress areas. The teachings of Paulsamy are relied upon to show the measuring of dimensions in high stress areas (column 3, lines 12-25; column 4, line 46-column 5, line 13) wherein the dimensions of pipe thickness are measured in areas where wall thickness may change quickly, the dimensions used to calculate the stress on the component at a particular point, wherein it is understood that areas identified where wall thickness may change quickly are regions identified as subjected to high stress.

59. As to Claim 49, steps vii and ix-x, Applicant argues that there is no mention of a model in any of the passages from Scott cited by the Office. As discussed above with respect to step ii, Scott teaches a computer model of the structure (column 11, line 66-column 12, line 1) wherein "each structure will a distinct set of natural frequencies and will have a well-defined impulse response when the structure is new, unfatigued and has no existing cracks" and wherein the changes in the impulse response or frequency spectrum will indicate structural changes in the structure. It is understood by the

Examiner that this set of natural frequencies and impulse response of the structure constitutes a computer model of the structure since they are indications of the behavior of the system. Scott further teaches a computer model (column 16, line 64-column 17, line 4), wherein "mathematical modeling" of a potential new building design can be created using the method and apparatus disclosed in Scott. These computer models are used to analyze the structure (column 12, lines 1-7, "...the impulse response will change...continuous identification of either the impulse response or equivalently, the frequency spectrum of the structure allows for identification of structural changes..."; column 16, line 64-column 17, line 4, "...mathematical modeling and laboratory testing..."), wherein the structure is analyzed using the changes in the computer model of the structure. Further, Scott teaches a continuously updated real time assessment of the structure wherein the impulse response and natural frequencies of the structure will change (column 10, lines 9-14; column 12, lines 1-7). It is understood by the Examiner that the model of the structure, defined initially by the impulse response and natural frequency of the new, unfatigued structure, is continuously updated with the new impulse responses and natural frequencies that are measured continuously by the sensors and reflect the changing physical dimensions of the structure.

60. Applicant argues that Carter does not assist the Office and indicates that a proper prima facie case to combine Scott and Carter has not been established. The Examiner sets forth that Scott and Carter are analogous art since they are both directed to the continuous assessment of the structural integrity of a structure including monitoring the growth of cracks in the structure and set forth a motivation to combine

since Carter et al teaches a model environment for representing evolving 3-D crack geometry and for testing various crack growth mechanics through automated simulation that lessens the tedious and time-consuming operations that are usually associated with crack growth analyses (Abstract, lines 2-3 and lines 10-11). It is the Examiner's position that a proper prima facie case has been established.

61. Applicant argues that Paulsamy does not assist the Office since, like Scott, Paulsamy is directed to actual measurement in contract to claim 49 which uses a computer simulation and calculates high-stress areas representing a potential problem at the beginning of the monitoring. It is the Examiner's position, as discussed above with reference to the individual steps of claim 49, that all the claim limitations are taught or suggested by the cited art.

Conclusion

62. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

63. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary C. Jacob whose telephone number is 571-272-6249. The examiner can normally be reached Tuesday-Thursday, 7AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on 571-272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mary C Jacob/
Examiner, Art Unit 2123

/M. C. J./
7/8/08

/Paul L Rodriguez/
Supervisory Patent Examiner,
Art Unit 2123